Key findings

More than one-quarter (26 percent) of the reported fires in 2016–2020 occurred in home structures. In addition, three-quarters (75 percent) of the civilian fire deaths and almost three-quarters (74 percent) of the reported civilian fire injuries \(^i\) during that time were caused by home \(^ii\) structure fires.

During this five-year period, US fire departments responded to an estimated average of 343,100 home structure fires per year. These fires caused an annual average of 2,610 civilian deaths; 11,090 civilian fire injuries; and $7.6 billion in direct property damage.

Certain scenarios appeared to be more dangerous during this time than in the past. The death rate per 1,000 reported home fires that began with the ignition of either upholstered furniture or mattresses and bedding in 2016–2020 was more than double what it was in 1980–1984.

Most home fires and fire casualties resulted from one of five causes: cooking, heating equipment, electrical distribution and lighting equipment, \(^iii\) intentional fire setting, and smoking materials. Over the five-year period of 2016–2020, cooking was the leading cause of home fires and home fire injuries. Smoking materials caused the most home fire deaths.

While the number of reported home fires and home fire deaths have been cut in half since 1980, and population-based home fire and home fire death rates have fallen by roughly two-thirds, both the death rate and injury rate per 1,000 reported home fires has remained consistent. This rate was slightly higher recently than it was in 1980 for homes overall and even more so for one- and two-family homes. It appears that most of the reduction in fire deaths over the past decades has been due to a reduction in fires rather than the prevention of harm after a fire is reported.

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\(^i\) Death and injury estimates exclude firefighter casualties.

\(^ii\) The term home includes one- or two-family homes, manufactured homes, and apartments or other multifamily housing, regardless of ownership.

\(^iii\) The term electrical distribution and lighting equipment includes installed wiring, outlets, switches, cords, plugs, power supplies, and lighting.

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Trends in reported fires

Figure 1 shows that the 2021 estimate of 338,000 reported home fires was 54 percent lower than the estimate of 734,000 in 1980 and 5 percent lower than the 2020 estimate of 356,500. These results, which come from the NFPA fire experience survey, are provided annually in the NFPA Fire Loss in the United States report. \(^1\) The decline in reported fires was sharpest during the 1980s, continued more slowly in the 1990s, and mostly leveled off in the past two decades.

The 2021 estimate of reported fires in one- or two-family homes was 57 percent lower than in 1980 and 5 percent lower than the 270,500 in 2020. The 2021 estimate of fires in apartments or other multifamily structures was 43 percent lower than in 1980. Apartment fires decreased 5 percent from 86,000 in 2020 to 81,500 in 2021. This decrease was preceded by a sharp 15 percent increase from 2019 to 2020.

As reported in the fire experience survey, the 2021 home fire death toll of 2,840 was 45 percent lower than the 5,200 deaths in 1980 and 10 percent higher than the 2020 estimate of 2,580. See Figure 2.
The estimated number of reported home fire injuries in 2021 was 44 percent lower than the 1980 estimate and 3 percent lower than the estimated 11,500 in 2020. See Figure 3.

The population-based home fire and fire death rates in 2021 were roughly one-third of the rates from 1980. The rate of reported home fires per thousand population fell from 3.2 in 1980 to 1.1 in 2021. In addition, the 2021 rate of 8.7 home fire deaths per million population was 62 percent lower than the 22.9 deaths per million population in 1980. See Figure 4.

In 2021, the overall home fire death rate per 1,000 reported fires was 8.4, a 19 percent increase from 1980. The death rate per 1,000 reported apartment fires fell 31 percent to 4.9 during the same period. The rate of 9.5 deaths per 1,000 reported one- or two-family home fires was 34 percent higher in 2021 than in 1980.

While rates fluctuated, 1984 was the only year in which the death rate per 1,000 one- or two-family home fires (6.5) was lower than it was in 1980. See Figure 5. During 2016–2020, 71 percent of US housing units were one- or two-family homes, including manufactured homes but excluding attached one-family homes such as row or townhouses.

The 2021 rate of 38 civilian injuries per 1,000 apartment fires was 52 percent higher than the 1980 rate of 25.1. For one- or two-family home fires, the 2021 rate of 31.2 injuries per 1,000 fires was 14 percent higher than the 1980 rate of 27.3. The 32.8 injuries per 1,000 home fires overall in 2021 was 22 percent higher than the 26.8 rate in 1980. See Figure 6.

One reason for the disparity between the death rates in apartment fires and one- or two-family home fires is that there are more code requirements for regulating apartments than one- or two-family homes. As a result, apartment buildings are more likely to have monitored smoke detection systems that notify the fire department when activated. This could also result in more minor fires being reported in apartment properties. From 2016 to 2020, 60 percent of the reported apartment fires had incident types indicating a confined cooking fire. Many were extinguished by the time the fire department arrived. Only 22 percent of the fires in one- or two-family homes were confined cooking fires. Apartments are also more likely to have sprinklers than one- or two-family homes.
About the data

The trends discussed above are based on summary data collected by NFPA’s fire department experience survey. The survey results are combined with the more detailed, incident-based National Fire Incident Reporting System (NFIRS) data to provide a deeper understanding of the causes and circumstances of these fires. This report is based on the NFIRS national dataset for 2020. Estimates are typically presented as national averages. Unknown data were allocated proportionally.

When are home fires most common?

Not surprisingly, home structure fires are more common in the cooler months when people spend more time inside, as well as in the hours when people are awake in the home. In 2016–2020, 46 percent of the home structure fires and 55 percent of the home structure fire deaths occurred in the five-month span from November to March. The number of reported home fires peaked from 5:00 to 8:00 p.m., when many people are coming home from work, preparing dinner, or engaging in other household activities. Only one-fifth (17 percent) of the home fires during this period were reported between 11:00 p.m. and 7:00 a.m., but these fires caused nearly half (41 percent) of the home fire deaths.

Figure 5. Deaths per 1,000 reported home fires by year and occupancy: 1980–2021

![Deaths per 1,000 fires](image1)

Figure 6. Injuries per 1,000 reported home fires by year and occupancy: 1980–2021

![Injuries per 1,000 fires](image2)

Leading causes of home fires

Estimates of the leading causes of fires and associated losses in 2016–2020 were pulled from several data elements in NFIRS, so double counting is possible. The likely severity of a reported fire can be measured in deaths or injuries per 1,000 fires and average property loss per fire.

Figure 7 shows that cooking was the leading cause of reported home structure fires and civilian fire injuries and the second leading cause of civilian fire deaths from 2016 to 2020. Cooking caused an average of 166,430 home fires per year. These fires caused an annual average of 520 civilian deaths; 4,520 civilian injuries; and $1.2 billion in property damage.

Cooking was the leading cause of fires in both one- or two-family homes and apartments, but it caused a much larger share of fires in the latter (72 percent) than the former (37 percent). This is likely due to the aforementioned regulation in apartments; as they utilize more smoke alarms and sprinkler systems, more minor fires are reported. While cooking was the leading cause of home fires and fire injuries, it ranked lower on casualties per 1,000 reported fires (3 deaths and 27 injuries) and was last among the major causes for average loss per reported fire ($7,200). See the NFPA report *Home Cooking Fires* for more details on how cooking fires start.
Fires started by smoking materials have been the leading cause or one of the leading causes of home fire fatalities for decades. This was still true for the 2016–2020 period, during which an estimated average of 15,900 such fires caused an average of 620 deaths; 1,030 injuries; and $549 million in direct property damage annually. The 39 deaths and 65 injuries per 1,000 reported fires caused by smoking materials were five times the rate of deaths (8) and twice the rate of injuries (33) per 1,000 reported home fires overall. For more information, see the NFPA report *Home Fires Started by Smoking*.

Heating equipment was the second leading cause of home fires and home fire injuries and the third leading cause of home fire deaths and direct property damage from 2016 to 2020. An average of 44,210 such fires caused 480 deaths; 1,370 injuries; and $1 billion in direct property damage per year. Heating equipment was the second leading cause of fire deaths in one- or two-family homes, immediately behind smoking materials. Although space heaters, including portable heaters and those that are permanently installed, were involved in only 4 percent of the total home fires, these incidents accounted for 16 percent of all the home fire deaths. Confined chimney or flue fires accounted for 5 percent of the total home fires and 7 percent of the fires in one- or two-family homes. Losses from these incidents were minimal.\(^iv\) For more information, see the NFPA report *Home Heating Fires*.

Electrical distribution or lighting equipment was the leading cause of home fire property damage. An average of 30,740 such fires caused 390 deaths; 1,090 injuries; and $1.4 billion in direct property damage annually. Electrical wiring and cable insulation accounted for 5 percent of all the home fires and 4 percent of all the home fire deaths. Cords or plugs were involved in only 1 percent of the fires but 6 percent of the deaths. Extension cords dominated the cord or plug category.

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\(^iv\) In this report, any home fire with an incident type of confined chimney or flue fire is considered a chimney fire. The *Home Heating Fires* report includes a breakdown of the equipment involved in these confined chimney or flue fires. Consequently, it shows more fires in fireplaces and fixed heaters, usually woodstoves, and fewer chimney fires.
Electrical failures or malfunctions can occur in any type of equipment powered by electricity. In 2016–2020, half of these fires involved electrical distribution or lighting equipment.\(^3\) Cooking equipment, heating equipment, fans, air conditioners, and dryers accounted for most of the remaining home fires started by electrical failure or malfunction. More information can be found in the NFPA report *Home Fires Caused by Electrical Failure or Malfunction*.

The 29,400 intentional home fires per year from 2016 to 2020 caused an annual average of 360 deaths, 820 injuries, and $596 million in direct property damage. More information is available in the NFPA report *Intentional Structure Fires*.

According to death certificate data, 61 percent of all the intentional fire or flame deaths in 2016–2020 (including non-home fires) were suicides.\(^4\) Conventional fire prevention and fire protection efforts alone cannot prevent these deaths.

Intentional fires heavily overlap with, but are not identical to, legally defined arson fires. For example, children under the age of legal responsibility sometimes intentionally start fires.

Candles started an average of 7,200 home fires (2 percent) annually, resulting in an average of 100 deaths (4 percent), 660 injuries (6 percent), and $298 million in direct property damage (4 percent). Candle fires had an injury rate of 91 per 1,000 reported fires, roughly three times the overall home fire injury rate.

The 11,100 home fires per year resulting from exposure to another fire (3 percent) caused an average of 30 deaths (1 percent), 70 injuries (1 percent), and $757 million in direct property damage (11 percent).

In the past decade, the leading causes of home fire deaths have converged. See Figure 8. For most of the past few decades, smoking materials were clearly the leading cause. Smoking materials were the leading cause of home fire deaths over the five-year period of 2016–2020. The last year in which smoking materials were not the leading cause of home fire death was in 2015, when it was surpassed by cooking fires.

Xiong, Bruck, and Ball conducted interviews with Australians who survived unintentional residential fires without serious injury. They grouped the fire causes into three broad categories: unsafe human behaviors, human long-term inaction, and no human action involved.\(^5\) Their research could provide some insight into the US fire experience. Unsafe human behaviors were reported in almost half of the Australian fires (46 percent) and typically occurred within a short time (hours at most) before the start of the fire. Unattended cooking, playing with fire, combustibles too close to a heat source, and discarded cigarettes are examples of unsafe behaviors. Forgetfulness and distraction were also mentioned frequently.

These categories (unsafe human behavior, inaction, and no human action involved) could be applied to the traditional US fire causes mentioned throughout this report. For example, a review of the factors contributing to ignition in cooking fires in 2014–2018 showed that the vast majority of these fires and casualties were caused by unsafe human behaviors, such as unattended cooking, abandoned material, combustibles too close to cooking equipment, unclassified misuse of material, or equipment that was unintentionally turned on or not turned off.\(^6\) Failure to clean the grease from
a stovetop or oven is an example of human long-term inaction. Roughly 10 percent of the cooking fires were caused by mechanical or electrical failures or malfunctions, which are general examples of fires with no human action involved. In some cases, these failures might have occurred because the equipment was worn out.

Similar breakdowns can be done for other causes, such as heating and electrical distribution and lighting equipment. While such an analysis is beyond the scope of this report, breaking out the causes in this way can help better target prevention strategies.

**Figure 9. Leading areas of origin in home structure fires: 2016–2020**

- **A. Fires**
  - Kitchen or cooking area: 44%
  - Bedroom: 6%
  - Unclassified outside area: 5%
  - Confined chimney or flue fire: 4%
  - Living room: 3%

- **B. Deaths**
  - Living room: 26%
  - Bedroom: 25%
  - Kitchen or cooking area: 17%
  - Unclassified function area: 7%

- **C. Injuries**
  - Kitchen or cooking area: 38%
  - Bedroom: 19%
  - Living room: 11%
  - Unclassified function area: 3%
  - Garage* or vehicle storage: 4%

- **D. Direct property damage**
  - Kitchen or cooking area: 14%
  - Bedroom: 12%
  - Garage* or vehicle storage: 10%
  - Living room: 8%
  - Attic or ceiling/roof assembly: 7%
  - Exterior balcony/open porch: 6%

*Does not include fires with property use coded as a residential garage.

**Area of origin, victim’s location, and fire spread**

As cooking is the leading cause of home fires and fire injuries, it is not surprising that the kitchen was the leading area of origin for home fires and injuries. See Figure 9. Apartment or multifamily housing fires were more likely to start in the kitchen (69 percent) than were fires in one- or two-family homes (33 percent). As mentioned previously, this is likely due to a greater presence of smoke alarms in apartments and a pattern of minor fires being reported more often in apartments than in one- and two-family homes.

Roughly two-thirds of the home fire deaths (68 percent) and injuries (68 percent) were caused by fires in just three rooms: living rooms, bedrooms, and kitchens.
While these three areas were among those associated with the highest property damage, home fires starting in garages (3 percent), on exterior balconies or open porches (3 percent), and in attics or ceiling roof assemblies/concealed spaces (2 percent) all caused a disproportionate amount of property damage. Fires in these spaces may be less likely to be discovered when the fire is small than fires in interior living spaces and are less likely to be protected by sprinkler systems.

Figure 10 shows that deaths from fires originating in living rooms fell more sharply than deaths from fires starting in bedrooms and kitchens. Historically, the largest number of fire deaths result from fires that start in living rooms. The differences between the three leading areas of origin for home fire deaths have decreased over time, with deaths from bedroom fires sometimes slightly exceeding the number of those resulting from living room fires.

Compared to home fire deaths in 1980–1984, the average number of deaths in 2016–2020 that resulted from fires that started in living rooms fell 64 percent, deaths from fires that began in bedrooms fell 45 percent, and deaths from fires that started in kitchens dropped 31 percent.\(^{\text{v}}\)

Fires in living rooms were more likely to cause death than fires in other areas. Despite the drop in deaths in all three locations, the average death rate per 1,000 reported fires was more than twice as high for fires that started in either living rooms or bedrooms in 2016–2020 compared to 1980–1984. Reported kitchen fires today are less likely to result in death than such fires in the earlier period. See Figure 11.

\(^{\text{v}}\) Version 5.0 of NFIRS was introduced in 1999 and was adopted gradually over the next several years. Due to the instability of the estimates for 1999–2001 — the transition years to NFIRS 5.0 — estimates for these years are not included in the graphs.
Leading items first ignited in home structure fires

With cooking being the leading cause of home fires, it is not surprising that cooking materials, including food, were the leading items first ignited in home fires and fires that caused injuries. A wider variety of items first ignited was seen with home fire deaths. See Figure 12. The two leading items in home fire deaths were upholstered furniture and mattresses or bedding, consistent with the leading areas of origin associated with fire deaths.

While upholstered furniture was first ignited in an average of only 4,630 reported home fires per year (1 percent), these incidents caused 390 deaths (15 percent), 600 injuries (5 percent), and $249 million in direct property damage (3 percent) annually.

The 7,820 fires per year that began with mattresses or bedding (2 percent) caused an annual average of 340 deaths, (12 percent), 990 injuries (9 percent), and $295 million in direct property damage (4 percent) annually.

Fires starting with upholstered furniture and mattresses or bedding are relatively low-frequency, high-consequence fires. On average, one of every 12 upholstered furniture fires and one of every 25 mattress or bedding fires in 2016–2020 resulted in death.

Figure 12. Leading items first ignited in home structure fires: 2016–2020

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vi NFIRS groups upholstered sofas, chairs, and vehicle seats into one code choice for item first ignited. NFPA combines two NFIRS item first ignited codes — a) mattress or pillow and b) bedding, blanket, sheet, or comforter — into the category of mattress or bedding. Some furniture, such as folded mattresses covered with upholstery fabric (futons), traditional sleep sofas with pullout mattresses, and upholstered furniture with cloth protectors or throw-style furniture covers, could potentially be coded as either upholstered furniture or mattresses and bedding.
In addition to being the leading items first ignited for fire deaths, both upholstered furniture and mattresses or bedding often served as secondary fuel sources, increasing fire spread even when they were not the item first ignited. A 2021 paper by Marty Ahrens noted that from 2013–2017, upholstered furniture was the major contributor to fire spread in an average of 2,000 home fires, causing 120 deaths annually. Mattresses or bedding were not the items first ignited but contributed most to fire spread in an average of 2,000 fires per year during that time, resulting in 50 deaths annually. When fires beginning with these items were combined with those in which the items contributed most to fire spread, they were found to account for 28 percent of the upholstered furniture fires and 21 percent of the associated deaths. This was also true for 19 percent of the mattress or bedding fires and 13 percent of the deaths.

**Leading heat sources associated with home fire deaths and injuries**

Three categories of heat sources — operating equipment; smoking materials; and lighters, candles, or matches (small open flames) — combined caused the fires that led to three-quarters of the total home fire deaths (73 percent) and injuries (74 percent) from 2016 to 2020.

Considerable attention has been paid to cigarettes and small open flames as ignition sources. While fires started by operating equipment such as ranges, heating equipment, dryers, and extension cords often have a human element, the role of operating equipment should not be overlooked. Automatic shutoffs and other safety features can protect against predictable human error.

The category of operating equipment includes the following four NFIRS heat source codes:

- Radiated or conducted heat from operating equipment
- Sparks, embers, or flames from operating equipment
- Arcing
- Unclassified heat from powered equipment

During 2016–2020, some type of operating equipment was the heat source in an average of 176,100 home structure fires per year (51 percent). These fires caused an annual average of 1,004 deaths (39 percent); 5,817 injuries (52 percent); and $3.1 billion in direct property damage (41 percent).

During the same period, lighters, candles, or matches were the heat source in an average of 24,900 home structure fires per year (7 percent). These fires caused an annual average of 316 deaths (12 percent); 1,471 injuries (14 percent); and $579 million in direct property damage (8 percent).

As discussed previously, smoking materials, including cigarettes, pipes, cigars, and undetermined smoking materials, were the heat source in an annual average of 15,900 home fires (5 percent) and caused an annual average of 619 deaths (24 percent); 1,029 injuries (9 percent); and $549 million in direct property damage (7 percent).

It is likely that some portion of the fires said to have been started by hot embers or ashes (23,000 fires; 99 deaths; 393 injuries; and $490 million in direct property damage) were started by smoking materials. Investigations performed by the Consumer Product Safety Commission (CPSC) into 19 fatal residential fires in 2017 in which the NFIRS heat source was hot ember or ash found that 13 were started by cigarettes. CPSC did not investigate non-fatal fires with a heat source code of hot ember or ash. NFPA has not made these adjustments in its analyses.

Consequently, it appears the estimates of fires started by smoking materials and the associated losses in this report likely underrepresent the true size of the smoking materials fire problem. It is also likely that some portion of the smoking materials fires were started by marijuana cigarettes. Unfortunately, such incidents cannot be identified using the coded data in NFIRS.

Figure 13 shows that deaths from fires started by smoking materials and by lighters, candles, or matches have fallen more than deaths from fires started by small open flames or operating equipment.
According to the Centers for Disease Control and Prevention (CDC), 33.2 percent of adults smoked cigarettes in 1980. In 2019, 16.7 percent smoked combustible tobacco products and 14 percent smoked cigarettes, specifically. The annual average death toll from fires started by smoking materials was 64 percent lower in 2016–2020 than it was in 1980–1984, while deaths from fires started by small open flames (lighters, candles, or matches) were down 59 percent compared to the earlier period. The death toll from fires started by operating equipment was 45 percent lower than in 1980–1984.

While the death toll from these fires has fallen, the death rate per 1,000 reported fires started by these heat sources has increased. The increase in death rates per 1,000 fires was not as large for smoking materials or small open flames compared to the rate of increase for fires starting in soft furnishings. This suggests that the heat source is not driving the increased death rates per reported fires for upholstered furniture or mattresses and bedding. See Figure 14.

Methodology

Supporting tables for all the fires in homes, one- or two-family homes, and apartments or multifamily homes are available online here.

Unless otherwise specified, the statistics in this analysis are national estimates of fires reported to US local fire departments and exclude fires reported only to federal or state agencies or industrial fire brigades. Estimates are projections based on the detailed information collected in the US Fire Administration’s National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association’s annual fire experience survey. Except for property use and incident type, fires with unknown or unreported data were allocated proportionally in the calculations of national estimates.

In general, any fire that occurred in or on a structure was considered a structure fire, even if the fire was limited to the structure’s contents and the building itself was not damaged. Only civilian (non-firefighter) casualties are included in this analysis. For more information, see How NFPA’s National Estimates Are Calculated for Home Structure Fires.
The causes shown are those that are well-defined and have clear prevention strategies or have historically been of interest. The data comes from several NFIRS data elements. Double counting is possible. For more information see NFPA’s Methodology and Definitions Used in “Leading Causes of Structure Fires” Tables.

Casualty and loss projections can be heavily influenced by the inclusion or exclusion of one unusually serious fire. Fires are rounded to the nearest hundred, deaths and injuries to the nearest ten, and property damage to the nearest million dollars. Estimates of zero may be true zeroes or may have been rounded to zero. Percentages were calculated on unrounded estimates. Annual averages do not include inflation adjustments.

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